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the birth of Christ, as the beginning of the era — the one now in common use by all Christian nations.

For ecclesiastical purposes the early Christians adopted in part, at least, the Jewish calendar, especially for the feast of Easter, the counterpart of the Jewish passover — the 14th of Abib, the first month of the year. "In the fourteenth day of the first month at even is the Lord's passover." — Leviticus xxiii., 5. But the fourteenth day did not generally fall on the Sabbath. Some churches celebrated Easter on the fourteenth, and some on the following Sunday. This caused some contention, and easily grew into a matter of supreme importance for the church. In the year 325 of our era, the council which convened at the city of Nicæa, beyond Constantinople, decided that the feast of Easter should be celebrated on Sunday, and that it should be the Sunday following the day of the full moon, which should occur on, or next after, the 21st of March. The intention was to fix the time of Easter as nearly as a movable feast could be fixed. The Jewish year was luni-solar — twelve months for one year, thirteen for the next.

Early in the fifteenth century the ecclesiastics noticed that the equinox was slipping away from the 21st of March. The question was discussed more or less for nearly two hundred years before final action was taken. In 1582 the equinox occurred on the 11th of March instead of the 21st, as at the time of the Council of Nicæa, in 325. Pope Gregory XIII., with the aid of able coadjutors, reformed the Julian calendar. His object was to prevent in the future such diversity of days in celebrating the same feast. The change made by Gregory consisted chiefly of two points: 1, The skipping of ten days in order to bring the equinox back to the 21st of March; and 2, To arrange an order of leap years which should prevent a like divergence thereafter. The omitted days were the ten following the 4th of October, 1582. The day which in the ordinary course of events would have been the 5th was reckoned as the 15th of October, new style. The Julian calendar, with every fourth year a leap year, is old style. Gregory excepted the centesimal years, decreeing that only those which are divisible by 400 should be called leap years. The year 1600 being divisible by 4 and by 400 was a leap year in both styles. Wherefore the difference between the two styles continued ten days for a century after 1600, viz., till midnight of the 28th of February, 1700. In new style, 1700, not being divisible by 400, was a common year, and the day following the 28th of February was March 1. But in countries which still adhered to the old style, 1700, being divisible by 4, was a leap year; so the day following the 28th of February was the 29th. Here there began a difference of eleven days between the styles. A like case occurred on the 28th of February in 1800, and the difference became twelve days, and will so continue till February 28, 1900; after which for 200 years the difference will be thirteen days. Russia still adheres to the Julian calendar, and the 12th of October, 1892, in that country will be the 24th in this.

The change of style by Gregory looked solely to the future, in order to prevent unseemly changes in the time or date of church festivals. It did not disturb the past at all, and was not intended to do so. As a proof of this, it may be stated that no date previous to October 4, 1582, old style, was ever changed by Gregory or any of his successors, or by any body of learned men, or of unlearned men; that no writer of history or of chronology in any European nation has changed or attempted to change such dates from old to new style. The discovery of America was on Friday, October 12, 1492, old style. It is so written "always and everywhere and by all."

It was reserved for the American Congress of 1892, instigated by a committee of some ill-informed society, to depart from established and uniform custom, and to declare that the 21st of October, 1892, should be celebrated as the 400th anniversary of the discovery. It is a "consummation devoutly to be wished" that this hasty and ill-advised action of Congress may die a speedy death, and that after this year it may never again be thought of or regarded in any way.

The present Pope, in his announcement concerning "Columbus Day," utterly ignores this act of Congress. He says, according to current reports in the daily press, that on the twelfth of Octo-

ber or on the following Sunday (the 16th) appropriate services will be had in commemoration of the great discovery. It is to be hoped that some friend will call his attention to the unadulterated wisdom displayed on this side of the Atlantic, regardless of the "effete monarchies" of Europe.

England adhered to the Julian calendar till about the first of September, 1752. To be specific, the order of Parliament was that the day following the second of September of that year should be called the fourteenth, and that the year which previously began on March 25 should begin on January 1, 1752, to conform to the Gregorian calendar. Macaulay, Hume, Robertson, and all other historians who have written in the English language of events in English history, give the dates in old style up to the year 1752.

In the colonies on this continent, planted by the French, Dutch, Spanish, and English, each followed the custom of the mother country, some using old and some new style. After the Revolutionary War Ramsay's Life of Washington was written. In it Washington's birth is given in old style only, viz., February 11, 1731,—conforming to the English custom of leaving unchanged all dates before the change of style. But "necessity knows no law;" so the conflicting dates of the various colonies were assimilated by all being made new style, for events occurring on this continent.

Such is a brief account of some points in chronology, which account may be of interest to many and may stir up some to a more careful study of a much neglected subject.

Oxford, Ohio, September, 1892.

SOME THOUGHTS ON THE PHYLOGENY OF THE MOLE CRICKET.

BY E. W. DORAN, PH.D., COLLEGE PARK, MD.

I HAVE recently been able to work out to some extent the life-history of the Northern Mole Cricket, *Gryllotalpa borealis*. The various stages of the insect seem not to have been studied extensively, or described, before. I have made some observations of interest which I have not seen recorded elsewhere, and which seem to indicate the course of development in this species. I am led to believe that formerly the insect lived upon the surface of the ground, or in natural hiding places, very much like our common field cricket, instead of burrowing into the earth, and passing all its existence under ground.

My first reason for supposing a change of habit has taken place is based upon the fact that the larva, before the first moult, is able to jump like the field and house-cricket. (Larvæ but little over a fourth of an inch long were seen to jump five or six inches in the breeding-jars.) They are otherwise very active and brisk in their movements. After this stage the insect cannot jump at all, and is very clumsy. It can run rather rapidly backward or forward in its burrow, or upon a level surface, but has very awkward movements upon an uneven surface. The abdomen is long and heavy, especially in the pupa and imago.

Now this would indicate that originally the mole cricket had the power of jumping like most other orthoptera, and all other *Gryllidæ*, I think, and lived upon the surface of the ground, perhaps hiding in crevices, or under rubbish, like the common cricket. But having taken to the burrowing habit, and no longer finding the necessity for exercising its power of leaping, it gradually lost that power, until it appears only in the early part of the larval stage.

My second reason for this conclusion is based upon the habit the mole cricket has of defending itself in the burrow by ejecting posteriorly a creamy, viscid substance in large quantities, which rapidly thickens after exposure to the atmosphere. This fluid seems also to have peculiar chemical properties. In this way it is able to protect itself from almost any foe which may attack it from behind, and it fights viciously if attacked in front. Now, the larva before the first moult does not have the power of ejecting this substance, and this would possibly indicate that in a previous stage of its development the mature insect was not so armed, for the young larva certainly needs protection as much as

in later life. This method of defence would not be so effectual upon the surface of the ground where its enemy could attack it from any source instead of directly behind or before, because with its unwieldy body it would not be able to eject the substance in any desired direction suddenly. This, then, appears to be a habit acquired by the insect since it has taken to its underground life; for it is hardly probable that it would be provided both with the habit of making long leaps to escape from its enemies, and at the same time to eject in large quantities this protective fluid.

There are some rather serious objections to this theory of changed conditions and habits. First may be mentioned the unusual development of the tarsus, fitting it for its underground life and burrowing propensities; but it is not unreasonable to suppose that the front legs were developed gradually in conformity with its changing habits. And it is perhaps true that if the insect lived upon the ground, it occasionally burrowed for roots, or for shelter, and originally had an unusual development of the tarsus. Its carnivorous habits may have been acquired in consequence of its frequent contact with earth-worms, when other food was scarce, as there are many other insects which normally feed upon vegetable food, that will resort to animal food, devouring even their own kind, as in the mole cricket, when pressed by hunger.

Second, an observation made by Westwood and others in Europe upon *G. vulgaris* would seem to weaken my argument regarding the development of the insect. It is stated that the larvæ of the European species, before the first moult, live together in one burrow, with the mother cricket, but scatter after this moult. I have seen the very young larvæ of our species only in confinement, and cannot say whether in the natural state they would scatter before this time or not. They run about in the breeding-cage more before the first moult than afterward. However, I think it probable that the mother cricket feeds the young, at this early stage, as she exercises great solicitude for them apparently, in other matters, or in time of danger. I have several times seen the mother take the young in her mouth when disturbed, as a cat does her kitten, and carry them to places of safety. She will also carry her eggs to a new burrow when they have been discovered, as I have several times observed. Hence it seems probable the young larvæ live together under the protection of the mother cricket, and would have but little need of a protective ejection. But the jumping habit which is chiefly useful in escaping from their enemies, being confined only to the early larval stage, presents a stronger argument for changed conditions. I may say, however, that neither of these are presented as conclusive arguments but rather mere suppositions or suggestions, to be followed up by other observations.

THE SCIENCE OF SMELLING.

BY PROF. DE VOLSON WOOD, STEVENS INSTITUTE, HOBOKEN, N. J.

THE greater part of the science of seeing is contained in the science of optics, and this is founded upon the theory of undulations of the ether and the way in which they are modified by the media through which they pass. The form of the surface, whether plane or curved, as well as the density of the medium produces marked effects.

Similarly, the greater part of the science of hearing is contained in the science of acoustics, and this also treats of undulations, or waves propagated in air or other gases. It is not believed in either case that solid particles pass from a source to the sensitive nerves to produce the particular sensation.

Why should there not be a science of smelling? The principal part of such a science would consist of an investigation of the mechanical properties of odors, and might briefly be called "Odorology." Is it not highly probable that odors are also propagated by undulations of an ether? And yet we are familiar with the statements made by writers, such as "A grain of musk will keep a room scented for many years. During the whole of the time it must be slowly evaporating, giving out its particles to the currents of air to be wafted presently out of doors; yet in all this time the musk seems to lose but little of its weight." "The acute sense of smell of the dog is well known; for he can detect

the track of his master long after the tracks have been made, which shows that some slight characteristic matter is left at each footfall."

Those who thus speak impart the idea that odor is material. I prefer to think of it as a property of matter, which produces its own peculiar undulations; and that the sensation of odor is produced by these undulations in the olfactories. Musk retains this property for a very long time, while some bodies lose it rapidly. The man may leave some characteristic matter on the ground at each footstep, but it is not necessary that particles of that matter shall pass from the ground into the nose of the dog in order that he may track his master. It is only necessary that that matter shall possess the property of sending forth certain undulations. Indeed, it is not difficult to conceive that the ground itself has imparted to it the property of sending forth the desired undulations.

These facts being assumed, investigations might be made to determine the velocity with which odors are propagated, and whether they are subject to reflection, refraction, and interference, and other properties common to sound and light; also whether the different odors are due to different wave-lengths, and if the strength and intensity of the odor is due to the amplitude of the wave, as in light and sound. The physiological qualities of the olfactories by which they enable one to detect odors of different qualities and intensities furnish a field for the most delicate and refined investigation.

NOTES AND NEWS.

PERSONS who are very susceptible to the effects of gnat-bites state that the irritation seems to return on the third day, and in those who have exceptionally sensitive skins again on the sixth day. Thus the effects of gnat-bites, or rather of the poison which they instil into our blood, have a certain analogy with the symptoms of intermittent fever. This need, perhaps, scarcely surprise us if we recollect from what materials the juices of the gnat have been elaborated.

—Herbert M. Thompson's "The Theory of Wages and its Application to the Eight-Hours Question," published by Macmillan & Co., is a timely contribution to the discussion of this vital question of the present industrial crisis.

—Lovers of birds and flowers will delight in Miss Yonge's new book announced by Macmillan & Co. Under the title of "An Old Woman's Outlook" she describes out-door life in England as she has watched it for so many years. The chapters are so arranged that each shall cover its special month.

—"Round London, Down-East, and Up-West" is the self-explaining title of a new book by Montagu Williams, barrister, author of "Leaves From a Life," etc. It will be issued by the Macmillans.

—D. Appleton & Co. will shortly add to their list of Good Books for Young Readers "Along the Florida Reef," by C. F. Holder, which is a story of camping and fishing adventures in company with a naturalist in Florida. The author combines entertainment and instruction, and his book is filled with illustrations which will be prized by every young reader who has ever visited the seashore, or cares for information regarding fishes, shells, and the various forms of marine life. The same firm will publish immediately "The Story of Columbus," by Elizabeth Eggleston Seelye, edited by Dr. Edward Eggleston, with nearly a hundred illustrations by Allegra Eggleston. This book is the result of extensive investigations which have been carefully verified by Dr. Eggleston. While the book contains all the results of modern inquiry offered in the bulkiest biographies, the story is here condensed and the material selected with a view to an always interesting narrative. To a considerable extent the plan of both text and illustrations is like that of Eggleston's "Household History of the United States." "The Story of Columbus" will be the first volume in a series to be called Delights of History, which will be prepared by the same author, artist, and editor.